cycles

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THE DIRECTOR'S LETTER

Dear Member:

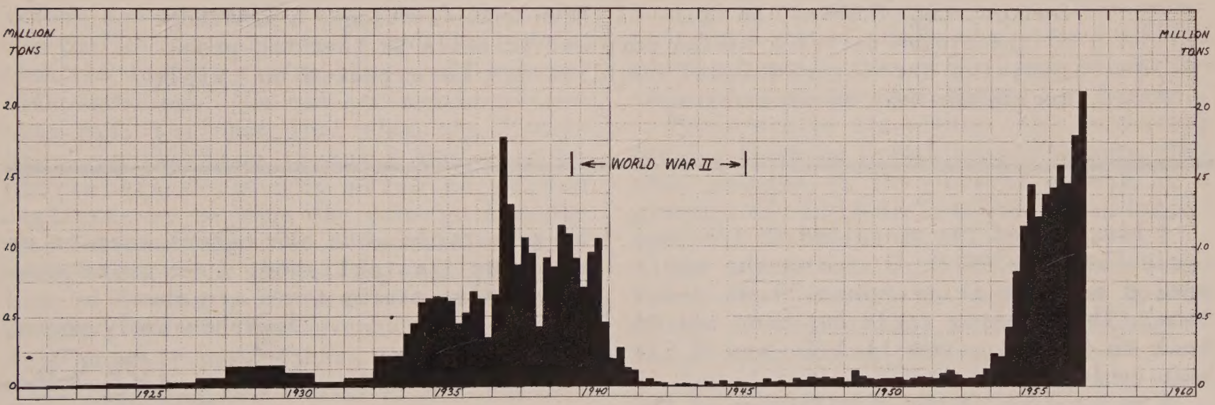
I was startled the other day, and not a little disturbed, to notice the extent to which scrap iron exports have soared just as they did prior to World War II.

Here is a chart which graphs the exports of scrap iron, year by year from 1921 to 1933 and quarter by quarter from 1934 to date. You see what I mean!

I do not know what country these exports ultimately reach, nor why they are being bought. However, superficially, the situation looks ominous.

This behavior on the part of scrap iron exports fits into the known cycles of international battles which I have told you about from time to time. As you know, the projection of these patterns calls for an increase in international battles from now until the mid 1960's. For the benefit of our new members, I am reprinting the synthesis chart on the next page.

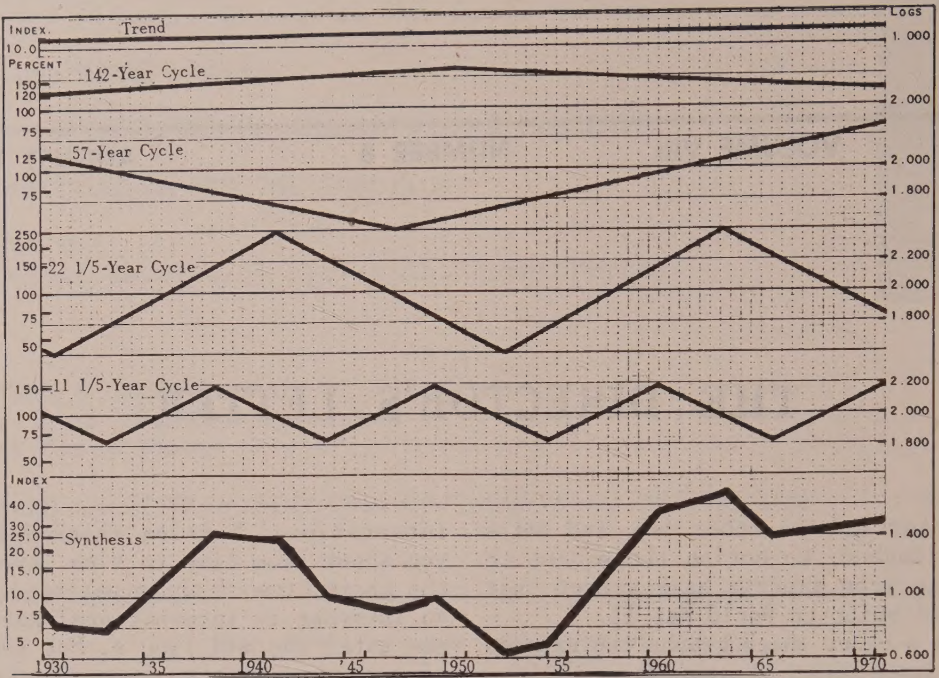
An increase of international battles does not necessarily mean World War III. And even World War III does not *necessarily* mean nuclear bombing of civilians. However, the projection of the cycles suggests a situation a bit too warm for comfort, don't you think?



EXPORTS OF SCRAP IRON

The bars show exports of scrap iron by years on a quarterly basis, 1921—1933, and by quarters, 1st quarter 1934 through 1st quarter 1957.

Note the great build-up of scrap iron exports during the years immediately preceding World War II. Note the corresponding build-up in 1955 and 1956. Does this parallel throw any light on the prospects for World War III?



This chart diagrams, from 1930 through 1970, the long term trend of international battles and four of the cycles that have been present in these figures over long periods of years.

At the bottom of the chart there is a diagram which shows the combination of these four cycles and the trend. This diagram suggests an increase of international conflict until 1963; then a decrease for two years, then another increase.

The diagram is to be believed only in a general way. There are many other cycles in international conflict, and many accidental factors, too. However, in spite of these qualifications, a knowledge of the cycles serves a useful purpose. It tells us that the probabilities for international conflict can be expected to triple during the next several years.

I have traced the so-called 22 1/5-year cycle back to 599 B. C. (over the whole period of time it measures 21.95 years long). The 142-year cycle has been traced back to 1 B. B.; the 11 1/5- and 9.57-year cycles back to 1750.

I am not sure of the significance of the 57-year cycle, but the others seem to me to be well established. I am quite confident that stormy times are ahead.

Apprehensively yours,

Edward R. Dewey
Director

Alan Gregg

It is with deep regret that we announce the death of Doctor Alan Gregg, a member of the board of directors of the Foundation for the Study of Cycles.

Doctor Gregg became a member of our board of directors on July 1, 1956, the day after he retired as Vice President of the Rockefeller Foundation. He joined our board to fill the vacancy caused by the death of Professor Ellsworth Huntington. His death is a great loss to the Foundation for the Study of Cycles and to all his many friends.

LONG TERM GROWTH TRENDS IN THE AMERICAN ECONOMY*

by Edward R. Dewey

III

The Growth Trend in Our Basic Industries

TO draw the trend lines that Pearl uses in such population charts as were reproduced in the foregoing pages, we need to deal with equations, of which the smooth curve is the graph. Such a method is too complicated for the average businessman who wants to explore trends. It is not only that he may lack the training in mathematics. Even more important, he will probably not recognize the fact that he is dealing with a logistic curve when he puts figures down on a chart.

A man who charted the growth of his infant son in pounds, every week from the day the boy was born, would ordinarily know that the rapidly rising line would eventually level out. (He can get weight charts that will tell him just when the "bend-over" in the line is due.) But when he charts his corporate sales he seldom realizes--as he sees the line go steeply up--that something like a logistic curve is being worked out here, too, and that the line will eventually bend over suddenly. Further, when it does eventually bend, he will usually regard this as a temporary slump that will be remedied by a resumption of progress in due course.

It is possible to avoid the dangers leading from such fallacious judgments by charting figures on semilogarithmic, or ratio, scale. That is, instead of using the Pearl type of graph, we can use a ratio scale, then get a curve which, by its changing shape, *automatically* reveals the falling off in the rate of growth. With such a scale the elongated italic of Pearl usually becomes a smooth elongated italic parenthesis .

When you use a ratio scale you plot numbers that have the same ratio to each other at the same vertical distance apart. For example, if you plot 2 a quarter of an inch above 1, you would plot 4 a quarter of an inch above 2. (Two is twice 1; four is twice 2. The ratio, "twice," is the same in both instances.) Similarly, 8, being twice 4 would be plotted a quarter of an inch above the 4, and so on. This means that on a ratio scale the values of the vertical scale get closer and closer to each other as they get bigger and bigger.

Ratio scales are coming into increasing use for charting growth trends because they show changes in the *rate* of growth at a glance, and because arithmetic scales do not.

Let us now turn back for a moment to the Pearl chart showing the population growth of the United States, printed in Chapter II. If we stood at 1920 on this chart, and no dotted line indicating the future were there to warn us, we might well assume that the upward sweep of the line would continue indefinitely. See Fig. 1. We might assume this, at least, if our knowledge were limited to that of the average American, and if our emotions were geared to the prevailing American sentiment that progress has always existed in this nation and

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*A REVISION OF CHAPTERS I-IV OF *Cycles—The Science of Prediction* BY EDWARD R. DEWEY AND EDWIN F. DAKIN, TOGETHER WITH SUPPLEMENTAL MATERIAL.

therefore always must--if not at the same rate as in the past, then at a still better one. Only specialized knowledge and training could warn us that this chart (as of 1920) could not justify such expectation.

Fig. 2 shows a chart of our population's growth on ratio, not arithmetic, scale. Standing at 1920 on *this* chart, we could have looked back and have been readily aware that we were approaching the top of a long slope that was already slowly leveling out. The steady decline in the *rate* of growth at this point is clearly evident, and the approximate point at which growth will peter out entirely is clearly indicated by the nature of this simple curve itself. Taking our place on this curve at 1920, we could have projected it into today without vast margin of error, even if we had merely worked freehand with a pencil. This kind of chart, which shows us the rate of growth at a quick glance, is preferable for charting trend.

Pearl has taught us something very valuable—that a *law* of growth exists, and that it operates consistently. In using hereafter a form of chart somewhat different from Pearl's, I am merely charting the operation of that law in a manner I believe the average reader will find more readily useful and applicable to his immediate problems.

It is in this form that the growth of America's basic industries will be graphed. The reader who then wishes to apply the method to his own business may easily come up with a comparable chart. All he need do is to chart his own figures on a similar grid, purchasable from any good stationery store*. He can then know immediately where his business stands, in comparison with other broader national developments, without having recourse to any special mathematical knowledge.

The 20 or more charts to be shown in connection with this chapter are rather striking in the uniformity of the story they tell. Consider first our total manufactures, which are shown in Fig. 3 in terms of their growth since 1810, in dollars compensated for changing purchasing power.* The *rate* of growth of our manufactures has been steadily declining from the very beginning of the figures, as you can see by the fact that the trend line is consistently concave downward. By 1920, as can be seen from the chart, it had become a fraction of the rate prevailing in the late 1800's. In at least one sense we may completely ignore the peak established during World War II. Notice that it reaches far above the trend line and surpasses all other peaks attained previously. Unfortunately—for the purposes of our study--it represents production for the purposes of destruction. Being a wartime phenomenon, it tells us nothing beyond the fact that under the centralized compulsion of a major war economy, and the zeal engendered by the emotion of a people at war, we had an enormous capacity to produce.

The underlying trend line tells us much more. What that line says is this: Under the economic system prevailing from 1810 to World War II we were constantly approaching the upper limit of our ability to produce and distribute within the frame of that system. A continuation of the pattern which prevailed from 1800 to 1940 will bring us to complete manufacturing maturity about the year 2000.

It will be noticed that the index of manufacturing production since the end of World War II is consistently above the trend line as I have determined and projected it. Does this mean that our economy is experiencing a rebirth, like the one enjoyed by Germany about 1860 and discussed in the previous chapter? Or does this excess mean that the trend from 1800 to 1940 was incorrectly determined? Or is the exceptional strength of the last few years merely a temporary reaction from the deficiencies of the 1930's? No one yet knows. However, assuming that the trend line is a little too flat, or even assuming a rebirth of our economy, the basic fact remains that we are rapidly approaching our maturity. A steeper trend line or

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*OR FROM CODEX BOOK COMPANY, NORWOOD, MASSACHUSETTS. SEND TO THEM FOR FREE CATALOG.

*ALL DOLLAR CHARTS IN THIS CHAPTER AND THE ONE NEXT FOLLOWING ARE SO COMPENSATED. THAT IS, THE VALUES FOR EACH YEAR HAVE BEEN DIVIDED BY THE INDEX OF THE AVERAGE WHOLESALE PRICES FOR THAT YEAR, 1947-1949 BEING CONSIDERED AS UNITY.

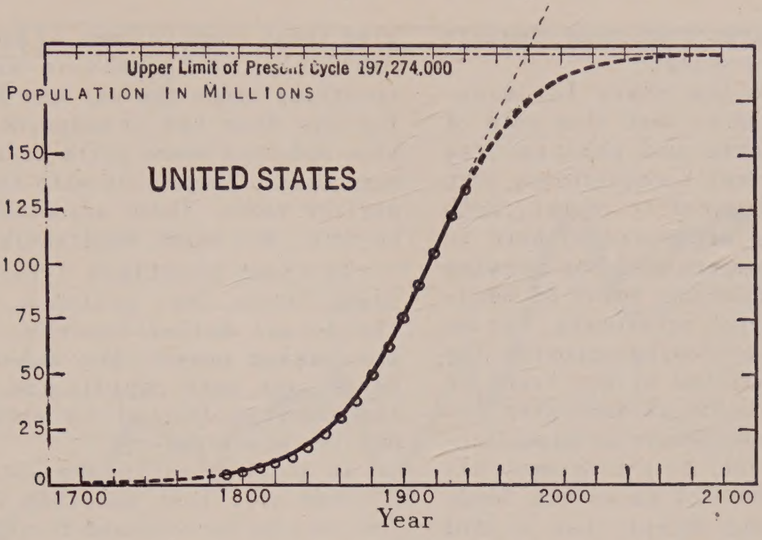


FIG. 1. GROWTH OF THE POPULATION OF THE UNITED STATES

This figure repeats Fig. 6 of Chapter II, except that a dotted line from 1920 forward has been added to show the sort of projection that a person who did not know about the laws of growth might have made at that time.

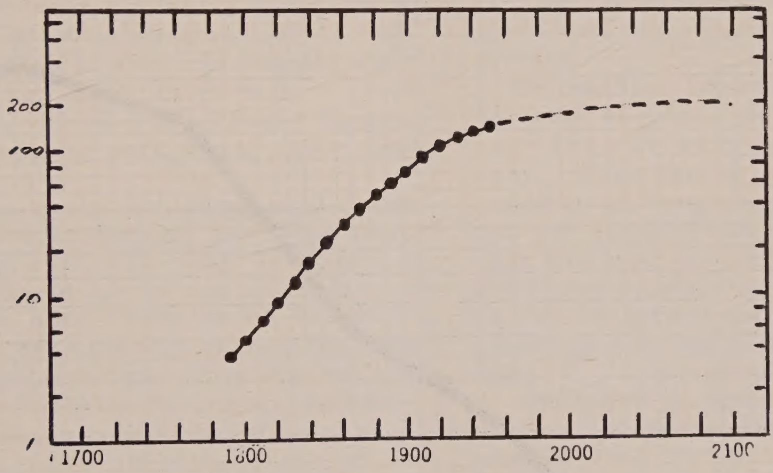


FIG. 2. GROWTH OF THE POPULATION OF THE UNITED STATES - Ratio Scale

This figure charts the same values as Fig. 1, but on ratio grid. Note that the curve is always concave downward and that it is gradually approaching the top of a long slope.

even a rebirth would only postpone the date for a relatively few years.

When we compare the chart for manufactures with the charts that show rate of growth of our exports and imports (see Figs. 4 and 5), we meet a consistency that we should now be prepared to expect. Both exports and imports are measured here in dollars that are compensated for varying purchasing power, like the value of manufactured goods, charted previously. Let us look first at Fig. 4 showing exports. The basic pattern established by the trend is undeniable, and it tells us something for the future. The export levels we established during World War II, by giving away almost unlimited volumes of goods via lend-lease, means nothing except that we did give these huge volumes of materials away. Similarly, the grants-in-aid to foreign countries since the war are likewise meaningless from the standpoint of *trade*. I have deducted these gifts to obtain figures more nearly comparable with the figures for earlier years. These adjusted values, 1945 to date, are shown separately on the chart.

To these plottings I have fitted two trend lines. One, called A, is fitted to the actual dollar exports, adjusted for purchasing power. The other, called B, bends over more rapidly and is fitted to the exports adjusted for purchasing power *and* for grants-in-aid.

It is interesting to note that trend B bends over less smoothly than trend A. That is, to force trend B to go though the

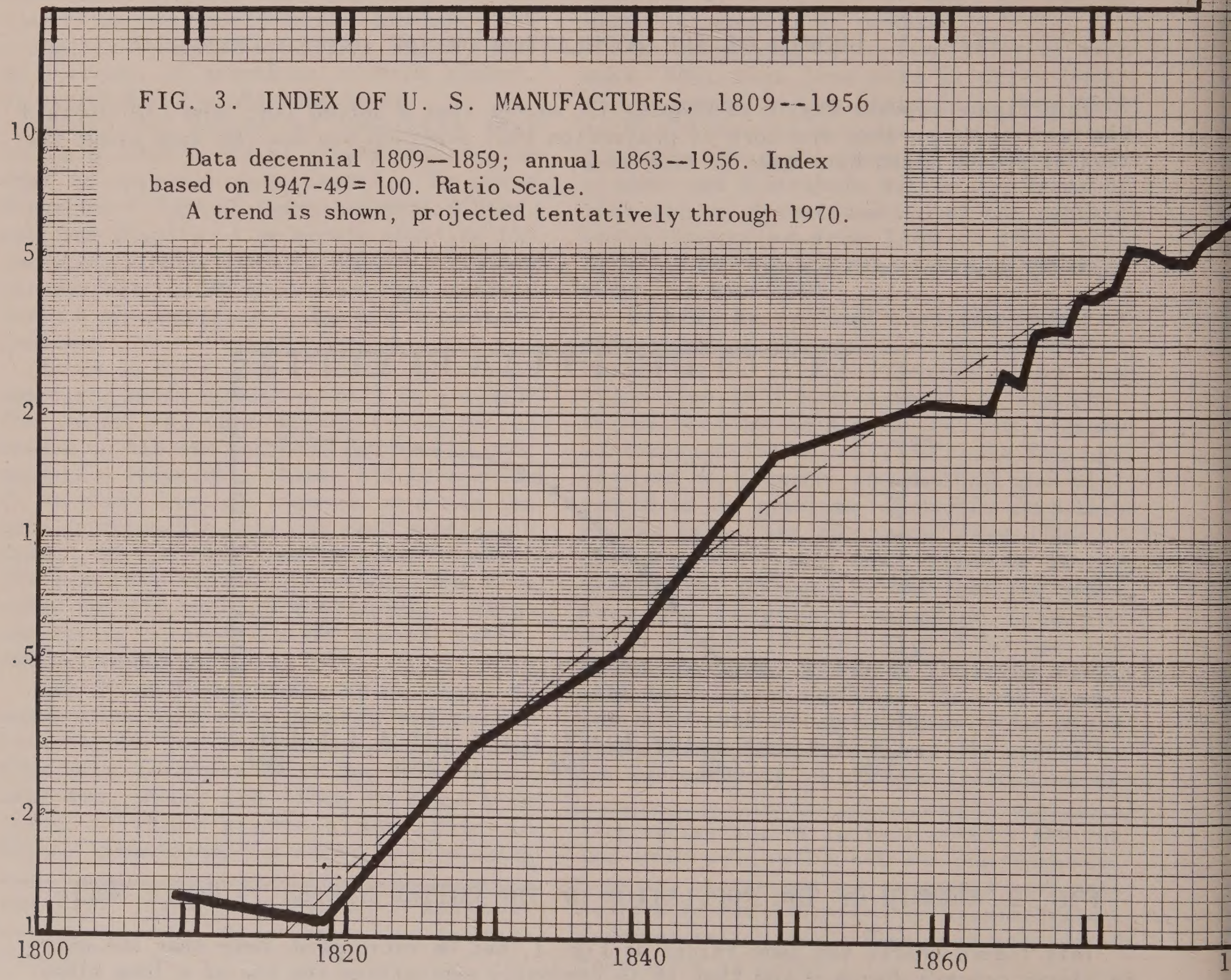
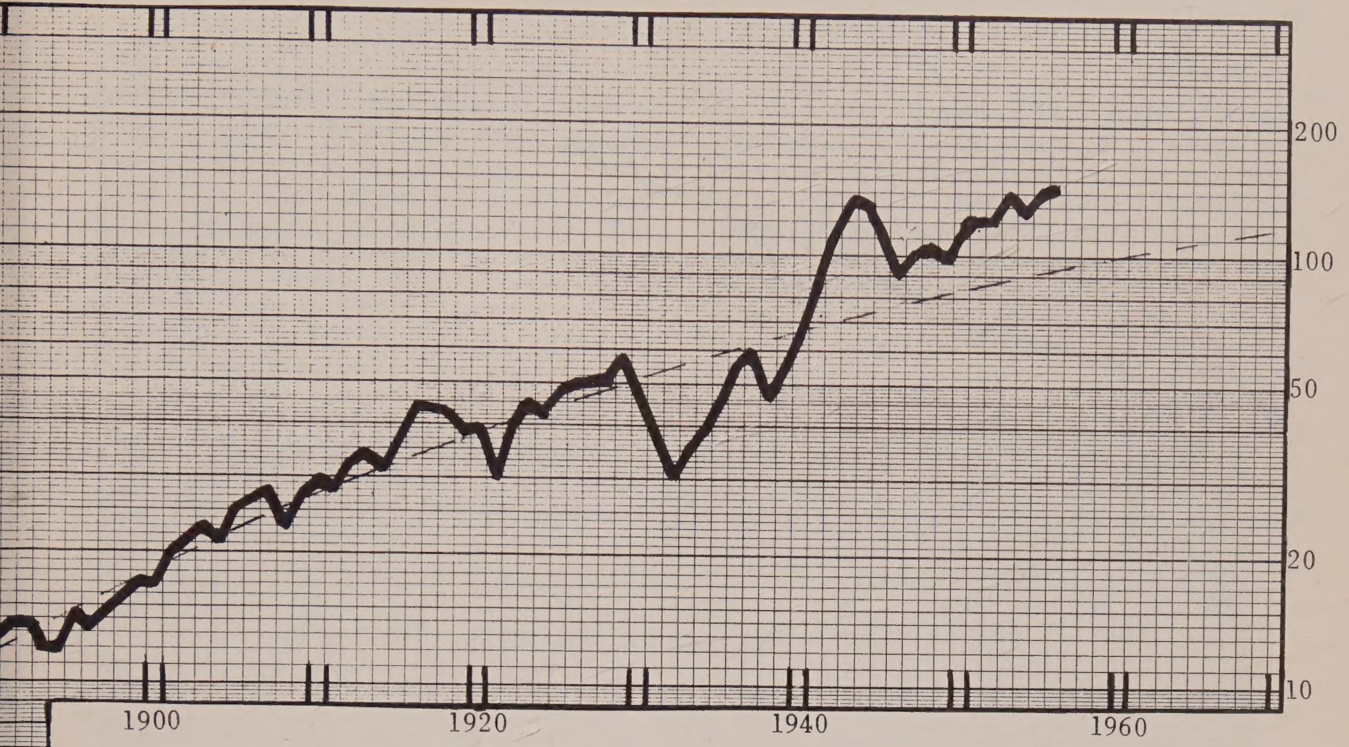


FIG. 3. INDEX OF U. S. MANUFACTURES, 1809--1956

Data decennial 1809—1859; annual 1863--1956. Index based on 1947-49 = 100. Ratio Scale.

A trend is shown, projected tentatively through 1970.



values adjusted for grants-in-aid, it is necessary to put a bit of a kink in it about 1920 to make it bend over faster than it had been bending. Trend A is a smoother curve and unfolds naturally according to the pattern established from 1790 to 1920. The implication is that our exports would have held up, even if we hadn't given goods away, if we had allowed natural economic forces to work during these post-war years.

In either event our chart says forthrightly in statistical language that, on the basis of the long established trend, we should not be too optimistic in looking for such trade to be increased importantly over present volume. In other words, the pattern here shows what we have seen in other charts. We are approaching—if we have not already reached—our upper limit of action within the frame of our economy as it has long existed. If we now continue to give our goods away, as in World War II and in the twelve years since—either as goods or in the form of credits or uncollectible loans exchangeable for our goods—then of course we might presumably maintain any chosen volume of exports. But that method of exporting, if used in peacetime trade over any long period of time, will itself be a kind of revolution. All our chart can tell us is that, failing a revolution of some sort, the pattern as established throughout the growth of our country will presumably prevail.

Merchandise imports, similarly charted for rate of growth in compensated dollars (see Fig. 5) tell us much of the same story. Here too we can see that if the patterns of the past prevail, maturity is not far ahead. From about 1870 the trend line has been bending over, thus showing a decrease in the *rate* of growth. As nearly as can be determined this basic rate of growth is very small indeed; at the present time.

Probably no industry so accurately mirrors progress in our industralized economy--and in turn is mirrored in that progress—as does our iron and steel industry. Charts showing the growth of that industry, and of many other important industries, will be shown in subsequent installments of this chapter, to be printed as fast as space permits, in early issues of this magazine.

E.R.D.

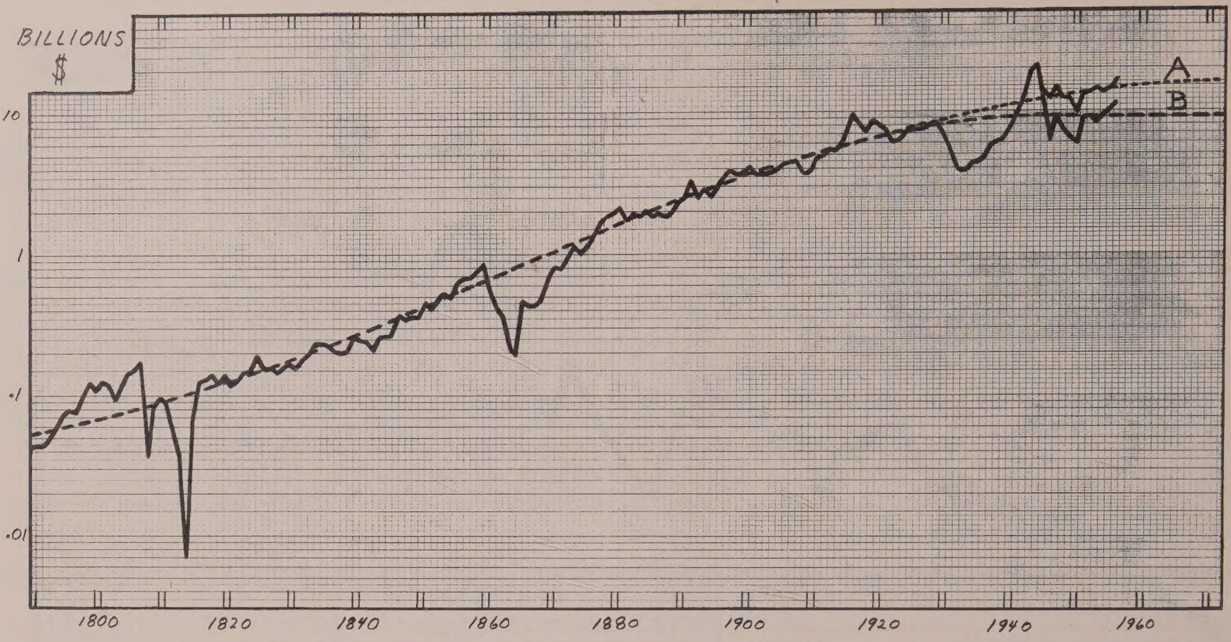


FIG. 4. UNITED STATES MERCHANDISE EXPORTS, 1790--1956

Data are adjusted for the purchasing power of the dollar, 1947-49 = 100. Values prior to 1821 include exports of gold and silver. Ratio Scale.

From 1945 forward two values are plotted for each year. The upper points represent actual exports adjusted as stated above. The lower points represent exports less the amount of our grants-in-aid, also adjusted for the purchasing power of the dollar. The difference shows what we gave away.

Trend lines A and B have been fitted to these two sets of figures and projected tentatively through 1972. Note that both trend lines are approaching a time of no further growth.

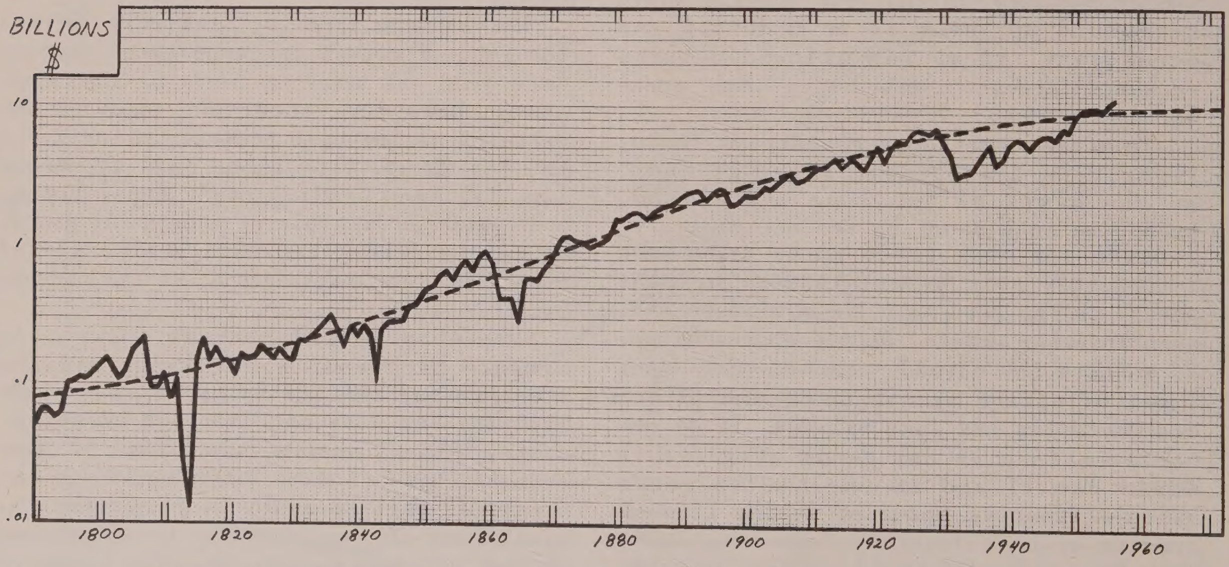


FIG. 5. UNITED STATES MERCHANDISE IMPORTS, 1790--1956

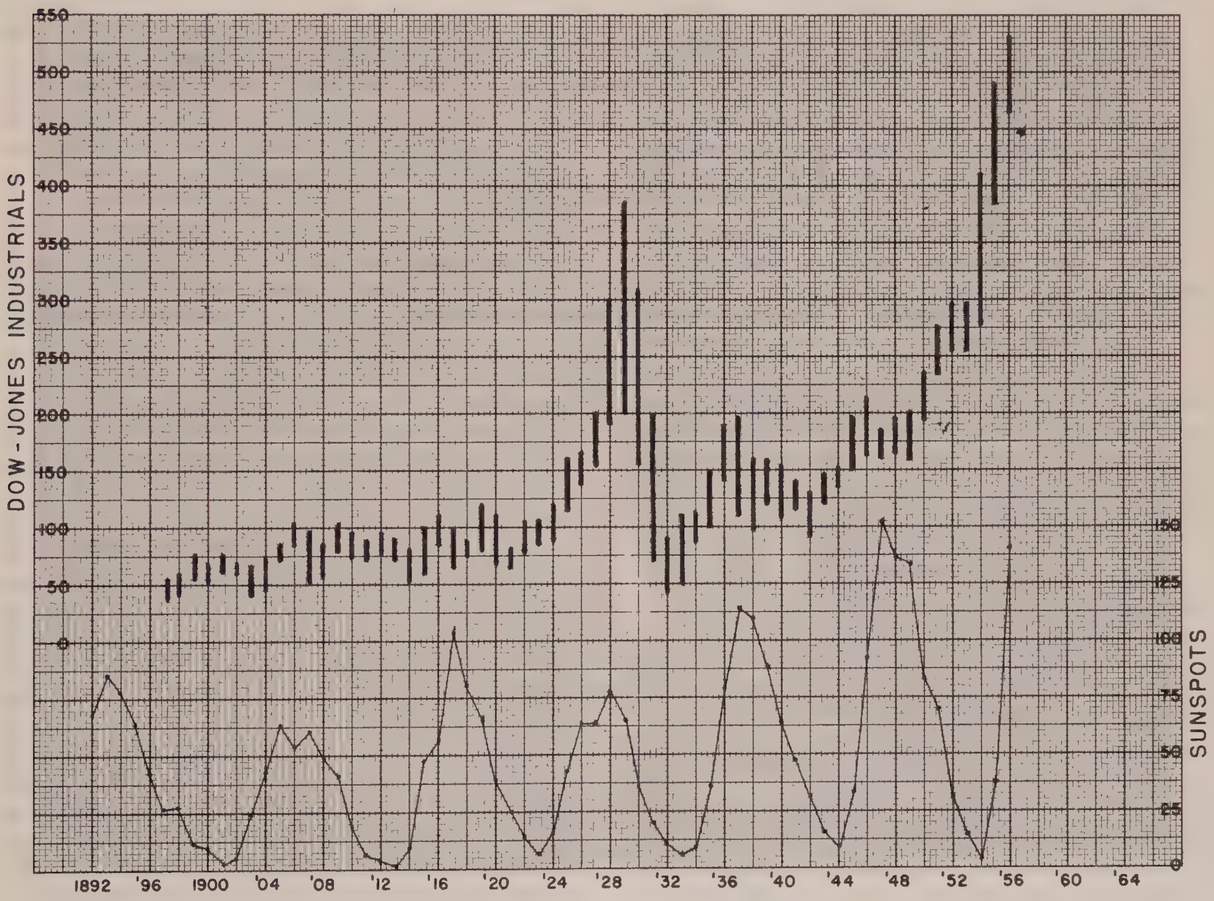
Data are adjusted for the purchasing power of the dollar, 1947-49 = 100. A trend is shown, projected tentatively through 1972. Ratio Scale.

SUNSPOTS AND STOCK PRICES

I HAVE printed below a chart prepared by Dr. Ludwig W. Blau and distributed by him at our Houston meeting.

The upper curve shows the yearly range of the Dow-Jones Industrials, 1897--1956. The lower curve shows the number of sunspots by years, 1892--1956. Over the period shown, there is in truth some tendency for stock prices to be strong when there are lots of sunspots, weak when sunspots are few. Moreover, I myself have found a trace of a cycle in stock prices that seems to have about the same length as the sunspot cycle (about 11 years). Notwithstanding these facts, I do not think that, as yet, we have enough correspondence between the two curves to suggest any convincing evidence of association. My own opinion is that the correspondence is merely happenstance.

E. R. Dewey



STOCK PRICES AND SUNSPOTS

Upper curve, Dow Jones Industrial range, year-by-year, 1897--1956.
Lower curve, Number of Sunspots, year-by-year, 1892--1956.

There has been some tendency for stock prices to be strong when sunspots were plentiful, but the correspondence is probably merely the result of chance.

THE 3- TO 4-WEEK CYCLE

OF ANTARCTIC AIR CURRENTS

DEAD calm and furious gales alternate in the Antarctic in rhythmic cycles of about 3 to 4 weeks or even longer. This fact, and what seems to be the reason for it, are set out in an article by H. H. Swinnerton, published in the January 1957 *Science Digest*.*

In this article Mr. Swinnerton says:

"The Southern Hemisphere polar region, in contrast to the Northern Hemisphere polar region , is occupied by a small continent, the Antarctic. This is almost completely covered by the largest ice sheet on the globe. Unlike the Greenland ice field, this usually extends beyond the land out onto the sea, and forms a vast floating platform upon which snow accumulates. Great blocks break away from the free edge of this platform and float slowly away as tabular, or flat-topped icebergs.

"One ice cliff left by the breaking off of these bergs is 300 feet high and 500 miles long. This is known as the Great Ross Barrier. Near other stretches of the coast line, mountains and even volcanoes rise up through the ice, and glaciers flow between them and down to the sea.

"The vast area of icy-cold surface exerts a remarkable influence upon the atmospheric circulation. The air lying in contact with the ice becomes very cold and heavy. It therefore flows down the spacious slopes of this continental ice field from the center towards the sea. As it does so, large volumes of air are drawn down from the sky above to the center. On coming into contact with the ice, this air, likewise, becomes so intensely cold that the very small amount of water it contains is frozen to a fine snow.

"This descending and outward flow of air continues normally for about three or four weeks, and may go on longer. At first the movement is quite gentle. Gradually the speed increases until it becomes a furious gale.

"As the descending air comes under great pressure it is compressed. Just as the repeated compression of the air in a bicycle pump makes it hot, so the temperature of this current increases. At last it may be so warm that it tends to rise and to act as a brake that gradually slows down the rate of flow until all is calm and still once more. This process is repeated rhythmically and unceasingly as long as this ice field, or any ice field of continental proportions, exists."

If Mr. Swinnerton's explanation is the correct one--and I have no reason to doubt it--we have here an example of a *dynamic* rhythm. An action-reaction sort of thing in which an excess in one direction produces an excess in the other, and so on *ad infinitum.*

A dynamic rhythm will usually change its wave length from time to time. After a distortion the waves will not usually revert to the old timing.

When Antarctic air currents have been measured accurately for a long enough period of time it will be possible to know if the dynamic explanation is the correct one If it is, the study of this cycle is purely for the weather people to bother about.

On the other hand, if this cycle is very regular over so long a time, and if, after distortions, it reasserts itself according to the *old* time pattern, a dynamic explanation will no longer suffice. Under these circumstances this cycle will "graduate" into a cycle that is properly the subject of the science of cycles as such.

The next step therefore is the accurate timing of these air current oscillations over many repetitions. Then we'll know where we stand.

E. R. Dewey

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CYCLES: THE PROBLEM AND THE SOLUTION

by Edward R. Dewey

As we progress in our efforts to found the new science of cycles, it is worth while to pause occasionally to see where we are, where we wish to go, and how best to get there.

It is not an easy thing to create a new branch of science. It requires work, thought, a sense of direction. Of these the third is the most important.

With these ideas in mind, this article will (I) review the subject of rhythmic cycles, (II) state the problem that confronts us, and (III) tell you how I think the problem can be solved.

I Rhythmic Fluctuation

Rhythmic or cyclic fluctuation characterizes the phenomena of 36 separate disciplines. Astronomy, physics, astrophysics, seismology, volcanology, sedimentary geology, hydrology, oceanography, bacteriology, limnology, ichtheology, mammalogy, ornithology, entomology, climatology, glaciology, terrestrial magnetism, medicine, physiology, botany, dendrochronology, agronomy, history, sociology, and economics are examples. More than 2,500 scientists have alluded to rhythmic fluctuation, have alleged it, and/or have studied it.

Rhythmic fluctuation is the name given to those variations in size, in number, or in quality that recur with reasonable regularity--that is, with a beat. The tides are rhythmic. So are the seasons. So are the numbers of certain animals. So are the number of sunspots. So are the variations in the thickness and thinness of certain tree rings.

Rhythm is often due to chance. Rhythm can be found even in the fluctuations of random numbers. However, although some of the regularities that have been observed are doubtless due to chance, there are 11 good reasons for thinking that at least some of the observed rhythms are *not* the result of chance. These 11 reasons are as follows:

1. Rhythmic cycles continue over many repetitions.

For example, our files record a 27.31-day cycle in barometric pressure in Greenwich, England, present for more than 1100 repetitions. A 9.18-month rhythm in the ton-miles of the Canadian Pacific Railway has repeated over 57 times.

It is hard to find more than 10 consecutive waves in random behavior; very hard indeed to find as many as 15.

2. Rhythmic cycles of seemingly unchanged wave length are present over long periods of time.

For example, a 21.95-year cycle in the index of international battles has been traced all the way back to 599 B. C., a span of over 2500 years.

3. Rhythmic cycles keep on coming true after discovery.

A 9.60 ±.01 year rhythm in the abundance of lynx in Canada, discovered in figures through 1904, continued to dominate subsequent figures from 1904 to date. The sunspot cycle is another example of a rhythmic fluctuation that has continued long after discovery.

When you search for rhythmic cycles in past behavior you are free to choose any wave length you can see in the data. However, for a rhythmic cycle to *continue,* the wave length is strictly limited to the length that has been found in the past. To find rhythmic cycles in random numbers that continue after discovery is 20, 30, or 40 times as hard as to find them in the original numbers. Hence, when you *do* find them, the odds are increasingly against the behavior being chance.

4. After a distortion, rhythmic cycles return to the old timing.

For example, the 33-month rhythmic cycle in residential building construction was badly distorted during the past war, but reverted to its old timing after the end of hostilities. Peaks and troughs conformed to a pattern which had been established and projected before the war had even started.

5. Rhythmic cycles which seem to have the same wave length have been found in diverse phenomena between which no causal interrelationship is apparent, This would be hard to find by accident.

For example, a paper in the April 1955 *Journal of Cycle Research* reports a 18.2- or 18.3-year cycle in the following ten phenomena.

Phenomena Evidencing 18.2 or 18.3-Year Cycles	Approximate Time of Ideal Crest
Marriage in St. Louis	1960.0
Sunspots with alternate cycles reversed	1960.7
Sales of an Industrial Company	1961.0
Real Estate Activity	1961.8
Sales of a Public Utility Company	1962.0
Building Construction	1963.1
Construction in Hamburg	1963.8
Java Tree Rings (inverted)	1964.4
Acreage planted to Wheat in N. Y. (inverted)	1966.3
Loans and Discounts	1966.8

6. Rhythmic cycles of the same wave length have turning points that often come close to each other in calendar timing. This fact suggests the possibility of a common cause manifesting itself in different phenomena according to their varying degrees of sensitivity.

For example, in the article referred to in item 5 we find that the turning points of the 10 rhythmic cycles mentioned come within 3.4 years (1/5 cycle) one way or the other of a typical or mean position. A majority of the turning points come within a year and a half (about 8%) one way or the other of typical timing.

7. Phenomena in which several rhythmic cycles have been found to exist simultaneously evidence a "beat."

When two waves come together they reinforce each other. When two waves are opposed, they obliterate each other. Behavior of this sort suggests that the observed phenomena may be the result of significant periodicities.

8. Cycle timing evidences latitudinal passage.

Research shows, for the cycles which have been studied with this thought in mind, that there is a tendency for the timing of all cycles to be later and later as the cycles are found progressively from either pole toward the equator. This behavior is called latitudinal passage of the epochs. (An epoch is any arbitrary point on a wave, such as trough or crest.)

This passage over the face of the earth is simultaneous in both hemispheres. When plotted on a chart it shows the butterfly pattern so characteristic of sunspots when they are plotted similarly.

9. Latitudinal passage evidences distortion similar to the distortion of magnetic declination patterns.

Not all the data used for the latitudinal passage studies conform precisely to the theoretical timing. Many of these divergencies are doubtless the result of random distortions, local conditions, and variations of other sort, including perhaps other cycles which the techniques used were unable to eliminate in the periods over which data are available. There may, however, be a more fundamental cause for some of the variations. When all of the irregularities are plotted upon a map of the world and connected with each other by isopleth lines, the stations showing early crests and the stations showing late crests evidence patterns. These patterns show a marked resemblance to similar patterns of distortion on maps of magnetic declination.

10. There is provocative evidence that cycle lengths may be related to each other by simple arithmetic ratios.

Rhythmic wave lengths seem to fall naturally into "families," the members of which are related to each other by double and by triple progression. That is, if there is a cycle x months long we also find cycles 2x, 4x, 8x, 16x, etc. *and* 3x, 9x, 27x, 81x, etc. Also, of course, cycles 1/2x, 1/4x, 1/8x, 1/16x etc. *and* 1/3x, 1/9x, 1/27x, 1/81x etc. Several such families of cycle length have been found.

You probably do not need to be warned that this is an area in which the inter-relationships may be in the mind of the investigator instead of in the wave lengths themselves. So many wave lengths have been observed that some can be found to fit almost any theory that it may occur to the investigator to spin. Even so, evidence of significant inter-relationship of cycle length is strong.)

11. The number of phenomena in which cyclic behavior has been observed is so great as to suggest that behavior of this sort is a fundamental characteristic of nature.

Refer again to the April 1955 *Journal of Cycle Research.* It takes ten pages merely to list the cycles that were reported upon in our monthly bulletin during the five years preceding.

Some of the rhythms that have been discovered are doubtless the result of chance but obviously many of them *cannot be*. What then could cause these non-chance rhythms? In general, one of two things; either a dynamic action—reaction sort of thing, like heart beats, or some outside regulating force such as that which governs the rhythm of the tides or the rhythm of the seasons.

Many rhythms are doubtless the result of internal dynamics. But here again, this simple explanation does not seem adequate to explain a substantial number of the examples. There are some mysteries here worthy of further investigation.

What it all adds up to is this:

Of the welter of rhythms that have been observed, many are doubtless mere random oscillations. Many are dynamic pulsations which, like brain waves, respiration, or heart beats, are the proper subject matter for the disciplines involved.

However, there is a sizeable residue of recorded rhythms where seeming identity of wave length and reasonable correspondence of phase suggests the possibility of forced oscillation and inter-discipline relationship. It is this latter aspect of rhythmic fluctuation which calls for further investigation, and which is the reason for our existence.

Dynamic rhythms can continue for many repetitions and over long periods of time. They can even continue after discovery. However, they cannot reasonably be expected to revert to the old time schedule after a distortion, nor, unless there is some basic underlying cause, will they be found more or less synchronously in different phenomena. Finally, the fact of latitudinal passage and the presence of families of cycles with seemingly related wave lengths suggest the possibility that we may be dealing with something even more basic than was originally suspected.

II The Problem

Basically the problem is to discover whether or not the behaviors described above have significance.

Progress in this direction is slow for four reasons:

(1) Most of the workers who study rhythm do not realize that the rhythms they observe could possibly be anything but dynamic behavior limited to their own discipline.

(2) Those who do realize the possibility of inter-discipline relationships do not, for the most part, realize the importance of accurate measurement.

(3) Those who do realize the need for precision, do not, for the most part, know the best ways of obtaining it.

(4) There does not exist today any adequate inter-discipline clearing house for cycle students.

Permit me to elaborate upon these four points:

Inter-discipline Possibilities. The first of the four points needs no elaboration. It is universally recognized that (with the exception of sunspots, which get blamed for everything) workers shun explanations outside of their own discipline. The economist seeks an economic cause, the biologist seeks a biological cause, the physician seeks a medical cause, None willingly considers the idea of, shall we say, a climatological cause. The climatologist on his part seeks a climatological cause and resists the idea of an astronomical one. And so on.

As long as it will suffice, this is the proper procedure, but there are numerous instances where it will not suffice. The workers in the various fields need to appreciate this fact.

Accurate Measurement. Even people who should know better are all too often vague in their referrnces to cycles. To build a science of cycles we need measurements which are as exact as the nature of the data permit. We need such information to know which cycles are related to each other, which are not. For example, we have records of a "ten-year" rhythm in the abundance of Canadian lynx and of a "ten-year" rhythm in the outbreaks of plagues of grasshoppers. However, more careful measurement shows clearly that the "ten-year" lynx rhythm is 9.6 years long, the "ten-year" grasshopper rhythm is 9.2 years long. It follows that there is no possible inter-relationship. Starting out together, the two rhythms will gradually pull apart until, after a few repetitions, one is upside down in relation, to the other.

To the contrary, in other instances, more and more careful measurements tend to confirm rather than to deny the suggested identity of wave length.

We need to record more than wave length. What is the calendar timing of the cycle? What is the degree of its rhythm? What is its energy? How many repetitions have there been? How many of these have occurred after discovery of the cycle? Are the waves of constant or of varying strength? What is the latitude and what is the longitude of the data?

Techniques. It is obvious that the techniques for the detecting, isolation, and evaluation of the rhythmic cycles in one discipline are the same as for those in another. The best available techniques need to be mastered by all workers in the field.

Clearing House. As for a clearing-house, the need is clear. Unless someone tells him, how is the mammalogist concerned with the 9.6-year cycle in the abundance of lynx in Canada, let us say, going to know that a 9.6-year cycle has been alleged in the abundance of chinch bugs in Illinois, in the abundance of Atlantic Salmon at Wye, in the rainfall of northern India, in the variation of atmospheric ozone at Kew, in human heart disease in the north east part of the United States, and in the acreage planted to wheat in our western states?

III How the Problem Can Be Solved

The solution to this problem, as we see it, is as follows: (1) *A Cyclopedia of Cycles* to record in one place, cross indexed by wave length and by discipline, all allegations of rhythmic behavior, (2) a *Directory* of living cycle workers, and (3) an adequate *Journal.*

(1) A Cyclopedia of Cycles. The cyclopedia of cycles is already under way, although it is progressing slowly.

(2) A Directory of Cycle Students. We published a directory of cycle students in 1940. This directory needs to be revised and reissued. However it provides a start, and a comparison of the authors mentioned in the *Cyclopedia* with the names listed in *American Men of Science* will quickly provide more names of living cycle students than can be handled.

(3) The Journal of Cycle Research. The *Journal of Cycle Research* was started in 1951. It is now well into Volume VI. It is a quarterly, usually of about 24 pages, 8½ x 11 in size, reproduced by offset. It is edited by volunteer unpaid assistance. It goes to libraries here and abroad and to individuals—mostly laymen—interested in cycle research. It is self-supporting.

We would like to make the *Journal* a much larger (48, 72, or 96 page) magazine, dedicated to good cycle writing, widely contributed to and widely read by scientists.

Good Cycle Writing

The essence of good cycle writing involves a presentation of (a) the unmanipulated data with notes as to source; (b) an exact description of the manipulation and/or methods used to detect, isolate, and evaluate the rhythm; (c) charts, and if possible, work sheets covering the entire analysis; (d) the determination of wave lengths and other cycle characteristics with the greatest possible precision.

Too often we read, for example, "I have discovered a ten-year cycle in the abundance of grasshoppers." In contrast, good cycle exposition requires the author to say, "I have discovered a 9.2-year (± .1 year) cycle in the abundance of grasshoppers in the United States, 1841--1940. Here are my data. Here, so that the reader can see if he approves, are my methods; here are my work charts; here are all pertinent work sheets. Crests of the idealized cycle come at 1847.2 and at 9.2-year intervals forward from that time. The current crest of the idealized cycle is due at 1957.6. The waves have a typical strength of 239% of trend at time of crest, 42% of trend at time of trough. They account for 52% of the variation from trend. Their shape is zigzag. They have repeated 10½ times in the available data. Trend was determined in such and such a way. Here is my evaluation of the significance of this cycle."

Almost no present-day cycle writing comes up to these standards. This failure, as mentioned above, is partly because the various authors do not realize the importance of precise measurement. Even more it is because space limitations and the cost of tabular material prevent most journals from publishing enough detail so that other workers can pass judgment on methodology or results.

The Procedure

As we see it, the *Directory* will provide the names of people working in this field. These people can be approached (and helped) to write the kind of material suitable for the *Journal*. Circulating the Journal to others in the field involved may elicit articles in criticism. In the event that material should be slow in coming, we, ourselves, have enough unpublished material to fill a 96-page quarterly continuously until 1972. However, it would seem much better to use the *Journal* as a vehicle for the publication of the work of others.

Finance

The kind of a journal we envisage will require the half time services of a good person and an allowance for printing the extra pages that are needed to do a worth while job.

The salary of such a person, and the cost of the extra pages cannot be met from subscriptions. The student of rhythm in the abundance of birds, for example, thinks of himself primarily as an ornitholomist. He subscribes to the *Auk*. He has neither the money nor the inclination to subscribe to an additional journal which devotes only one article in 36 to birds. So with the geologist, the astro-physicist, the economist, or the herpetologist.

We can probably count on the continuation of sufficient lay support to pay for the printing of the first 24 pages, and the other present expenses.

The extra money needed is $40,500 ($8,100 a year for five years).

Would *you* like to supply it?

How it Came Out

A PROJECTION OF FIVE CYCLES IN COPPER PRICES

DURING 1953 and early 1954 we isolated and projected five cycles in copper prices. The length, strength and timing of each of these five cycles are shown in the following table.

Length	Strength Relative to Trend		Time of A Crest
	Above	Below	
32.36 months	2.33%	2.27%	2nd Q. 1958
8.60 years	11.9%	10.7%	4th Q, 1950
9.28 years	14.3%	12.5%	1st Q, 1956
12.53 years	8.4%	7.7%	4th Q, 1952
14.8 years	5.6%	5.4%	2nd Q, 1959

I have already reported to you upon the 8.60- and the 9.28-year cycles (*Journal of Cycle Research,* Vol. 3. No. 4, Fall 1954, p. 99; *Cycles*, Vol. VII, No. 9, September 1956, p. 241). I shall report to you in regard to the other three cycles as soon as possible.

Forecast Shows Five Cycles Only

On March 25th 1954 we combined the five cycles into the broken line shown in the chart below. This line is made up merely of the five cycles, each according to its proper timing and its proper weight. It contains no trend and no allowance for inflation. It is shown as percentages above and below trend. The line does not include any of the other cycles undoubtedly present in copper prices. In the chart the combination or synthesis is plotted only from 1st quarter 1952 through 4th quarter 1962. However, from the information given in the table above, anyone can make the combination and can project it forward and/or backward as far as he wishes.

The actual price of copper (Electrolytic, New York, in cents per pound) from 1st quarter 1952 through second quarter 1957 is shown by the solid line. This solid line is made heavy from 1st quarter 1954 forward to show how prices unfolded after the forecast was made. As you can see, the forecast has been pretty good for timing, very poor for strength.

Buy-Sell Dates

The actual buy and sell dates called for by the synthesis are as follows:

Buy...........2nd Quarter 1954
Sell..........1st Quarter 1956
Buy...........2nd Quarter 1957
Sell..........2nd Quarter 1958
Buy...........3rd Quarter 1960
Sell..........1st Quarter 1961
Buy...........2nd Quarter 1962
etc.

Profit 100%

This synthesis is not advanced as a formula for the purchase and sale of copper. However, it is interesting to note that if, as called for by the synthesis, you had bought copper at the average price of 2nd quarter 1954 you would have paid 29.70% a pound; if you had sold at the average price of the 1st quarter 1956 you would have got 45.02¢ a pound. This would have given you a gain of 15.32¢ a pound, or 51.6%.

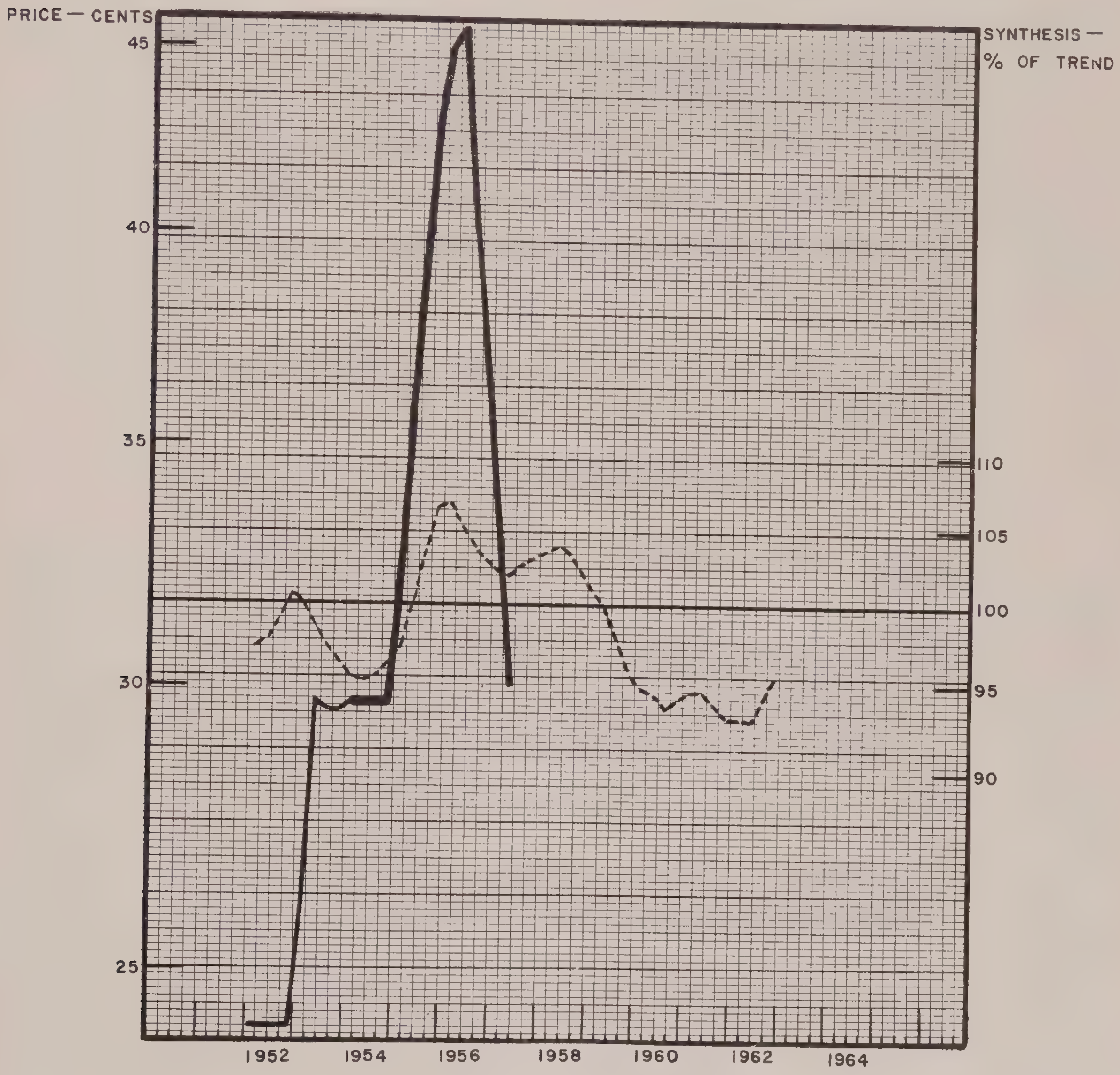
If, continuing to follow the synthesis, you had gone short in the first quarter of 1956 and covered in the second quarter of 1957, your gain would also have been over 50%.

You would then have bought in the second quarter of 1957 at approximately 30¢ a pound and would be planning to liquidate this purchase in the second quarter of 1958. How this transaction will come out, of course no one yet knows.

The synthesis and the actual prices quarter by quarter from 1952 forward, are plotted in the chart below. This chart brings up to date a chart I printed for you some time ago.

Bear in mind that cycles are only part of the copper picture. Obviously something in addition to these five cycles is influencing copper prices. This "something" has played along with the cycles for the last several years. It may continue to do so, or it may not! However, *as far as these five cycles are concerned,* the forecast is definitely upward until the second quarter of 1958. Then another decline is due to start.

E.R.D.



COPPER PRICES

Broken line: Synthesis of 32.36-month, and 8.6-, 9.28-, 12.53-, and 14.8-year cycles, 1st Q 1952—4th Q 1962. Note that no trend and no allowance for inflation is included. Synthesis made March 25, 1954. Scale for synthesis in percent. Ratio Scale.

Solid line: Actual price of copper 1st Q 1952—2nd Q 1957. Line is heavy from 1st Q 1954 to show behavior from date of synthesis. Scale for copper prices in cents per pound. Ratio Scale.

Letters

Failures and Reversals

Dear Ned Dewey:

I am interested in your May CYCLES report on Business Failures, but would like to raise a question about your intrepretation of the results.

I call your attention first to your chart on page 127 of the May issue and ask you whether you do not think that the period from about 1944 to about 1970 on your chart does not look like the period from say 1900 to 1931? If this is so, how can you say on page 138 that the increasing number of failures indicates "poor business"?

My thought about the failure increase is that it indicates *poor engineering* more than poor business because this must be so because the period from 1900 to 1931 was an era of great development and expansion.

My thought is that when business is on the up and up that a lot of people who should have stayed on the farm, possibly, see a lot of money being made by some people elsewhere, so that they are moved to get into some other line of business that they think will produce quick results. The net result is that these farmers, you might say, rush in where angels fear to tread and get stuck when they find themselves beyond their depth. Is this the way you would look at it on more reflection?

At the present moment when failures are on the increase the "blue chip" stock index of Dow Jones is doing relatively worse than the 500 stock Standard and Poor's Index, which contains all the cats and dogs, thinking them sleepers. Your Failure Index should be labeled Excitement Index. Notice that your Index (Failures or Excitement) is the same as Mr. PREDIX in his 1951 $10 chart which shows a series of rising tops from 1942 to 1965.

The most important feature of your May report is to me the chart on page 136 showing the 3.42 year cycle which is the same as the 40.8 month cycle that I have been talking about in my pamphlet. The point is that the cycle reverses polarity between 1943 and 1953 on your chart and in a previous period the same cycle reversed polarity between 1876 and 1886. I think I told you in a previous letter that I had noticed this repeat performance and that it was related to the synodic period of Saturn and Pluto. The time repeat period when the cycle gets out of step is roughly 67 years which is twice the synodic period of Saturn - Pluto synodic period of 33.34 years. The last opposition of Saturn and Pluto came in August 1947, which was in the middle of the last reversed cycle.

I am following this reversed cycle business very closely on individual stocks and, as I think that I wrote you previously, some types of stocks reversed while others did not. Thus, the Agricultural stocks are currently acting opposite to stocks like Oil companies. General Mills, American Agricultural Chemical and Texas Gulf Sulphur are now at their bottoms and are in gear with your Failure 3.42 cycle *(which is opposite to my regular 40.8 month cycle)*. The Oil companies and others are *topping* with my 40.8 cycle and reversing according to your 3.42 year Failure cycle.

If the out of step period is about 11 years as it was between 1876 and 1886 then we must be close to the *end of our reversal of cycle period* right about now. This would be difficult to determine with the minimum data we have on cycles. What I am afraid is that everything is now going to be hung up on the normal 40.8 month cycle top and then plunge to the normal bottom around the end of 1958.

Very sincerely,
W. E. D. Stokes, Jr.

Lenox, Massachusetts

THE MODIFIED GEISINGER INDICATOR

THE Modified Geisinger Indicator is a series of numbers which, in the past, have gone up and down ahead of corresponding movements of the Federal Reserve Board Index of Industrial Production. Thd Modified Geisinger Indicator thus throws some light on the probabilities of the future.

The F. R. B. Index of Industrial Production measures physical production in the U. S. A. It is a weighted average of tons, yards, gallons, and numbers of things produced each month.

The Modified Geisinger Indicator is the sum of two Indicators, the Geisinger Indicator and a First Difference Indicator.

The Geisinger Indicator was invented by Robert Geisinger. It is derived from figures which are published each month in the *Survey of Current Business*. It is charted for you as Curve A on pages 114 and 115.

Curve B on these same two pages charts the First Difference Indicator, which is merely the amount by which the smoothed F. R. B. Index is above or below the value for the preceding month. The smoothing is effected by means of a centered 3-month moving average and a 2-month moving average posted to the second position.

Curve C charts the sum of the values of Curves A and B. This curve is called the Modified Geisinger Indicator. It suggests in a general way what the F. R. B. Index may do some eight months later.

Curve D charts the values of the F. R. B Index of Industrial Production.

Curve E re-charts curve C, advancing it by 8 months. This advance is for two reasons (1) so that you can more easily compare the past behavior of the Modified Geisinger Indicator with the behavior of the F. R. B. Index, and (2) so that you can have a better idea of what the F. R. B. Index may do in the future.

FORECAST

INDUSTRIAL Production has leveled at 143.

The preliminary value given you last month of -3.2 for the Geisinger Indicator for March 1957 (November 1957 when projected) proved to be correct. The values for April 1957 (December 1957 when projected) will be up and will lie between -2.6 and .4.

Values for the 1st Difference Indicator and the Modified Geisinger Indicator are given below.

A sideways motion is indicated.

E. R. Dewey

July 25, 1957

Month	Advanced (8 Months Later)	Geisinger Indicator A	1 st Difference Indicator B	Modified Geisinger Indicator A+B	F.R.B. Index D
Jan. 1957	Sept. 1957	-3.2	0.00	-3.20	146
Feb. 1957	Oct. 1957	-2.6	-0.33	-2.93	146
Mar. 1957	Nov. 1957	-3.2	-0.83r	-4.03r	145
Apr. 1957	Dec. 1957	(-2.6 to .4)	-1.00r	(-3.6 to -.6)	143r
May 1957	Jan. 1958	*	-0.83p	*	143
June 1957	Feb. 1958	*	*	*	143p

p - preliminary r - revised * - not yet available

THE BEGINNER'S CORNER

RATIO LINE CHARTS—CONTINUED

YOU almost always use ratio line charts when studying long term trend.

Trend is the tendency of a series of figures to change direction slowly over a period of time. For example, the population of a country increases gradually over a number of decades; the sales of a manufacturing company or an industry do likewise. Trend is the broad basic tendency for growth (or decay), disregarding the minor up and down wiggles.

You use ratio ruling to study underlying growth trend because the *percentage* growth usually changes rather uniformly. The result of this fact is that when you chart sales (or anything else) on a *ratio* grid you can project the trend with fair accuracy by merely continuing the curve in the direction in which it has been going. (You cannot do this if the sales are plotted on ordinary arithmetic paper.)

Let me give you some examples:

Suppose that, during its first year, a business has a sales volume of $2,000 a year. Next year sales double to $4,000 a year. The third year they double again to $8,000.

On an arithmetic scale these facts would be represented by a chart laid out as follows:

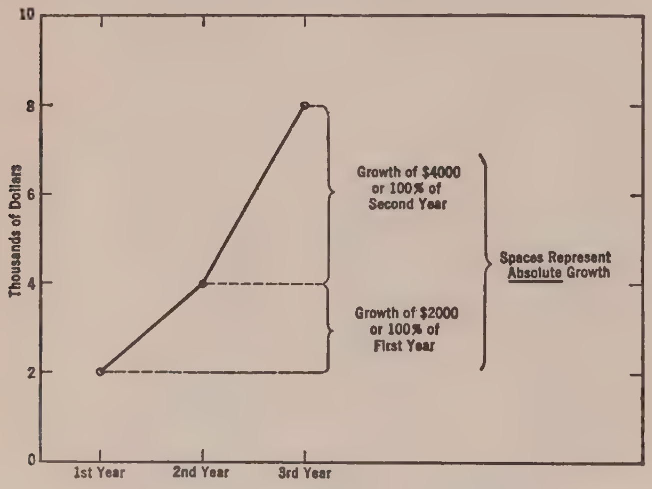


FIG. 1. EQUAL RATE OF GROWTH
Arithmetic Scale

Sales of a hypothetical business organization showing constant *rate* of growth. *Arithmetic Scale.*

On a ratio chart the same facts would be represented by a chart laid out in this fashion:

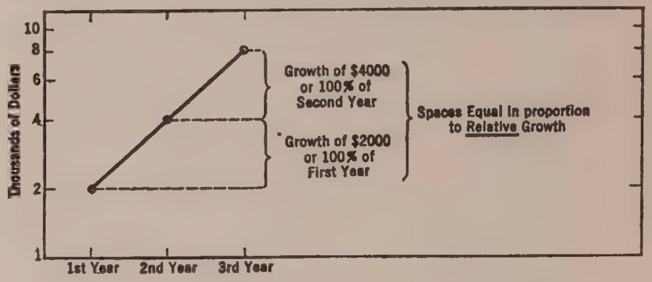


FIG. 2. EQUAL RATE OF GROWTH
Ratio Scale

Sales of a hypothetical business organization showing constant *rate* of growth. *Ratio Scale.*

Notice that on a ratio scale the numbers on the vertical scale represent equidistant percentage values, and come closer and closer together, in a way that interposes the same vertical distance between 4 and 8 as between 2 and 4 (because 8 bears the same relation to 4 that 4 bears to 2).

A straight line plotted on a ratio scale means that the *rate* of growth is constant. (Such a state of affairs, of course, never exists for long in any real situation.)

Now let us consider the situation where the *rate* of growth declines as the business gets older. Suppose our business had sales of $2,000 the first year, $4,000 the second year and *$6,000* the 3rd year instead of $8,000 as above. In other words suppose the *amount* of growth was the same ($2,000) instead of the *rate* of growth (which was 100% a year in the first example.)

This is a much more realistic situation. The growth the first year was 100%, the second year 50%. (The third year the growth might also be $2,000 but growth of this amount would be only 33 1/3%. If the same *amount* of growth continued another year the *rate* of growth would be only 25% and so on.)

Such a state of affairs (for the first three years) would be shown on the ordinary arithmetic scale as follows:

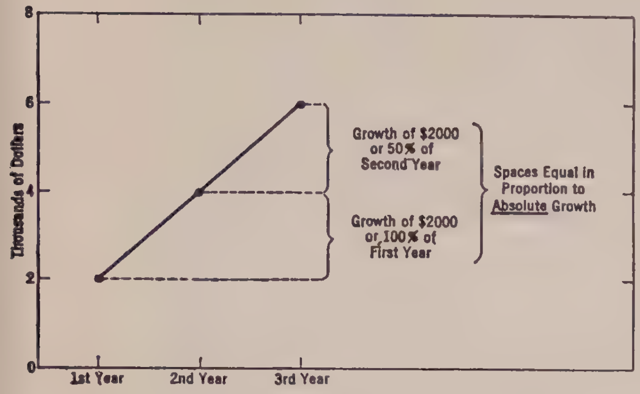


FIG. 3. EQUAL AMOUNTS OF GROWTH
Arithmetic Scale.

Sales of a hypothetical business organization showing constant *amount* of growth. *Arithmetic Scale*.

Note that the line connecting the three points makes a straight line.

On ratio scale however we get a chart that looks like this:

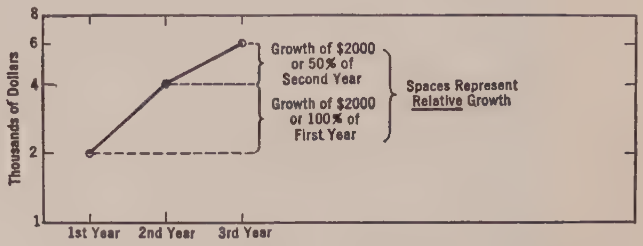


FIG. 4. EQUAL AMOUNT OF GROWTH
Ratio Scale.

Sales of a hypothetical business organization showing constant *amount* of growth. *Ratio Scale*.

Note that in the line connecting the three points bends over, concave downward, when the ratio grid is used.

Another example of a curve plotted on arithmetic grid and on ratio grid is shown below:

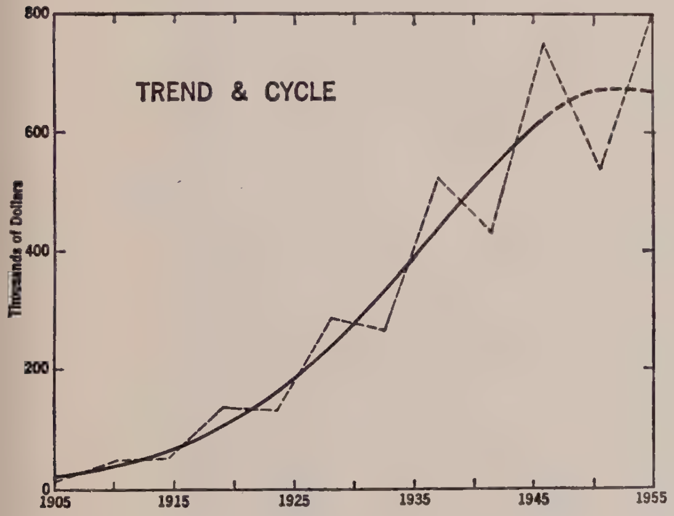


FIG. 5. THE TREND AND THE CYCLE

Trend of a hypothetical business organization (See Chapter I) with a regular 9-year cycle of 20 per cent amplitude superimposed. *Arithmetic Scale*.

Note that, at 1945, you would never suspect the rapid turn over in trend about to occur. Also note how small the cycle seems in the early years. You might almost miss it.

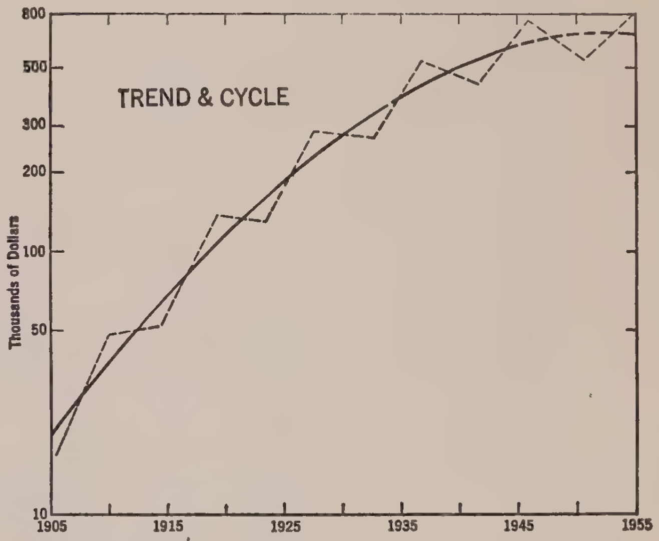


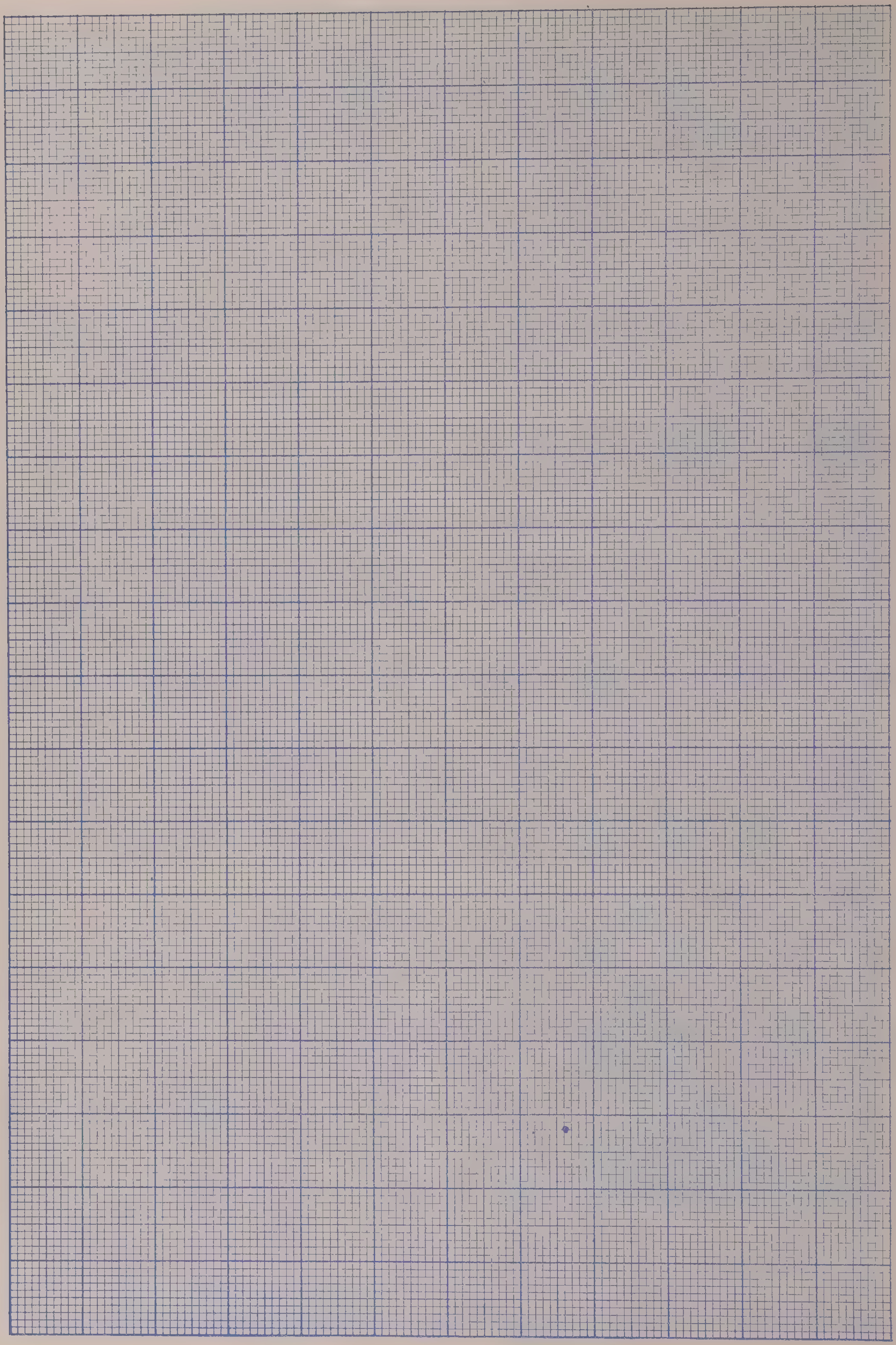
FIG. 6. THE TREND AND THE CYCLE

The same figures that were charted in Fig. 5, only plotted on *ratio* scale.

Note that at 1945 the future trend is a natural projection of trend behavior up to that time. Note also that the cycle is shown as importantly in the early years when the business was small as in the later years when the business was big.

SAMPLE OF CROSS SECTION PAPER

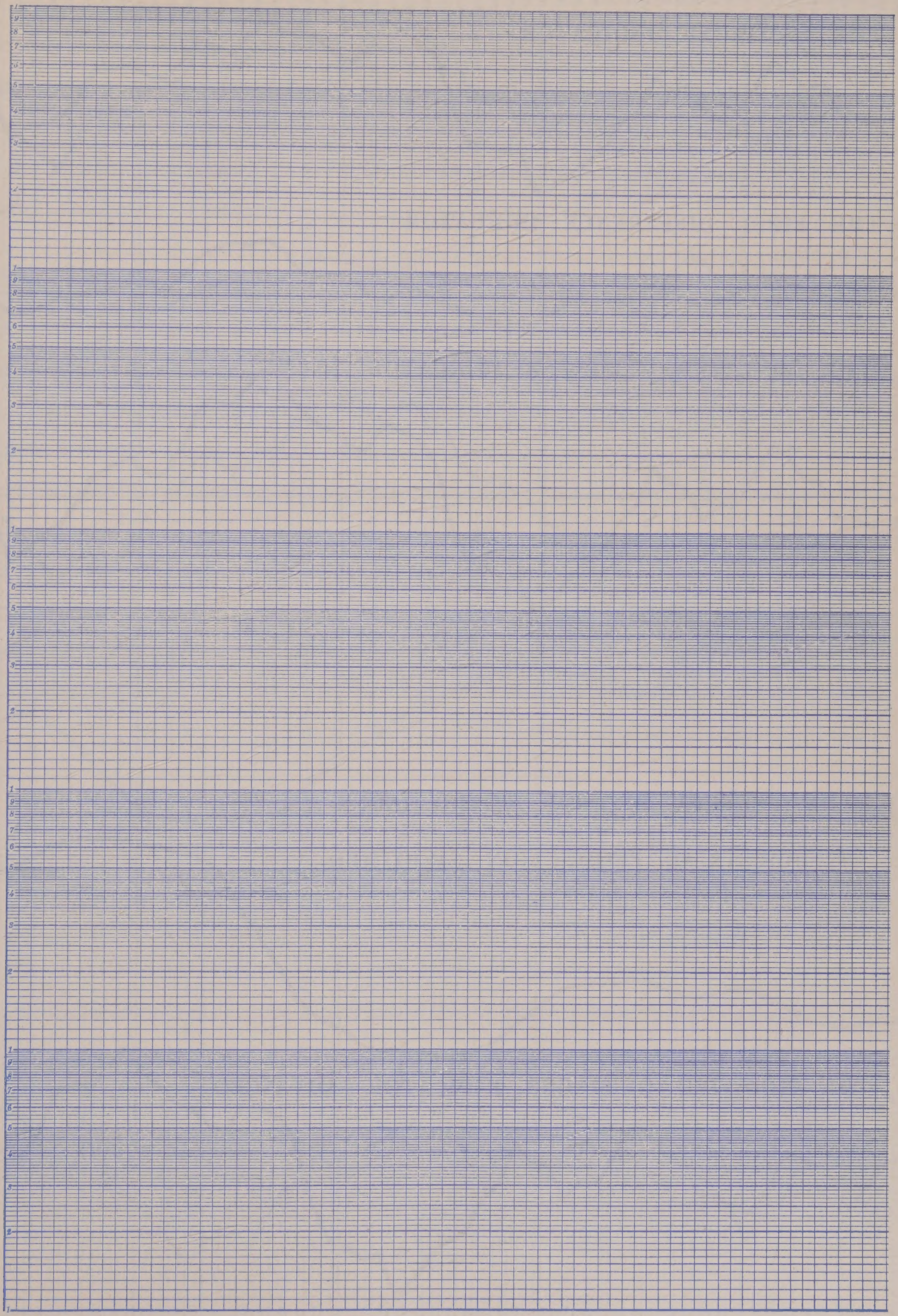
Twenty divisions both ways.



See "The Beginner's Corner," pages 218 and 219.

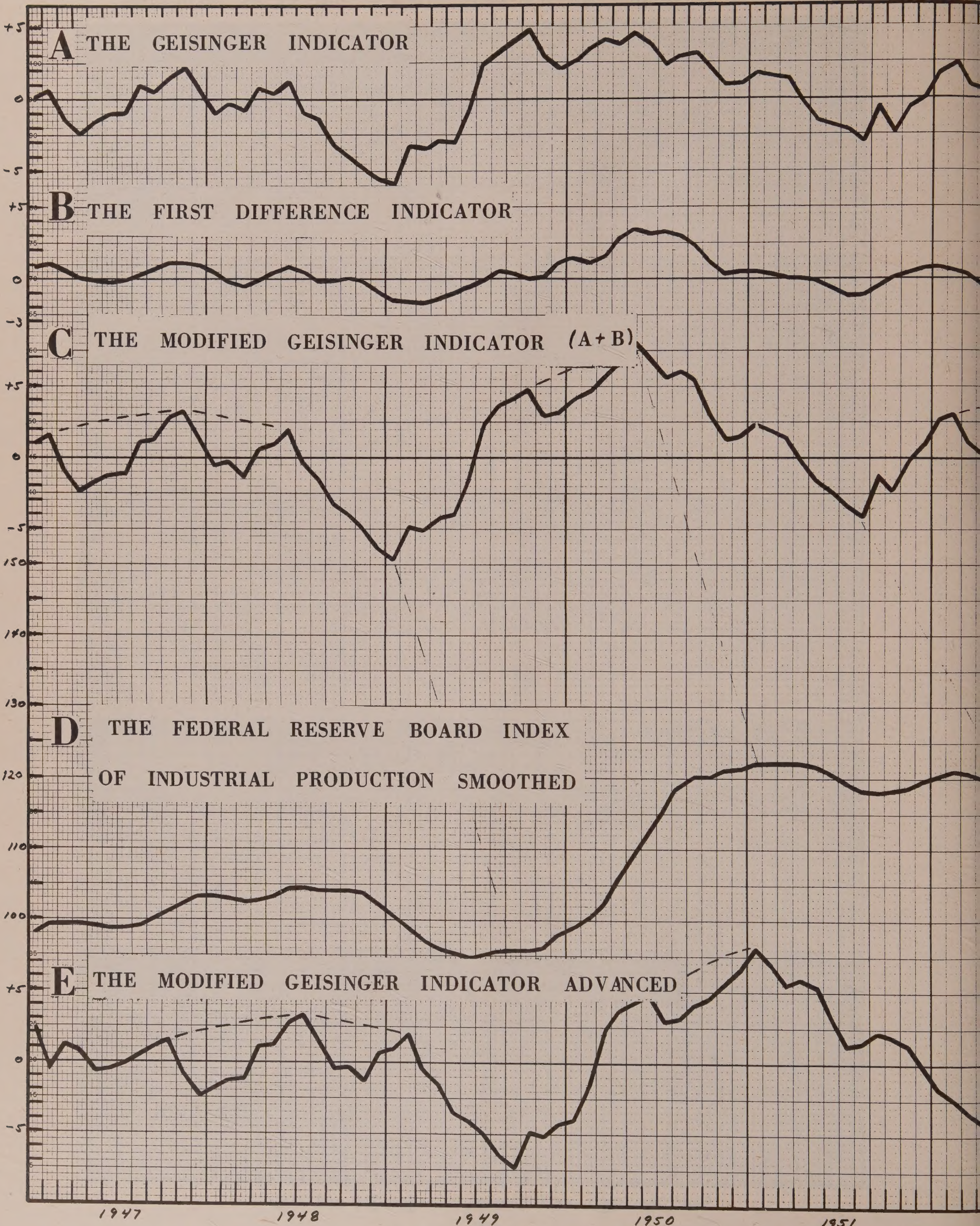
SAMPLE OF 5-CYCLE RATIO CHART PAPER

Horizontal scale, polypurpose. Vertical scale, five 1 4/5-inch cycles, ratio ruled.



See "The Beginner's Corner," pages 218 and 219.

THE MODIFIED GEISINGER INDICATOR



A THE GEISINGER INDICATOR

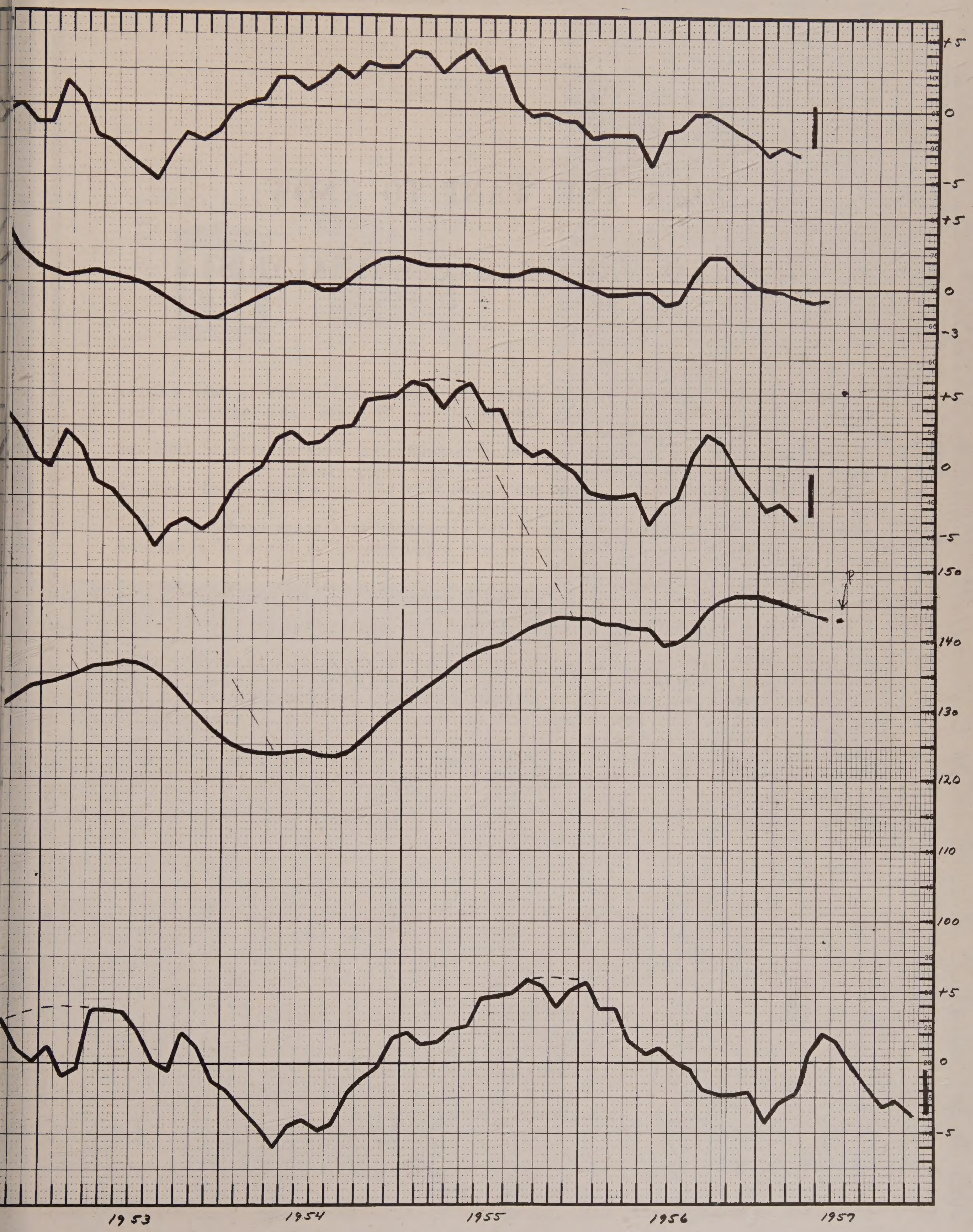
B THE FIRST DIFFERENCE INDICATOR

C THE MODIFIED GEISINGER INDICATOR (A+B)

D THE FEDERAL RESERVE BOARD INDEX OF INDUSTRIAL PRODUCTION SMOOTHED

E THE MODIFIED GEISINGER INDICATOR ADVANCED

OF INDUSTRIAL PRODUCTION



Turn to page 217 for the forecast.

Mr. H. A. Musham
741 No. Rush St.
Chicago, Ill.

DON'T YOU WANT TO KNOW

HOW TO MAKE A CYCLE ANALYSIS?

Edward R. Dewey, our Director, has written 23 lessons telling *How to Make a Cycle Analysis*. These lessons give you the essence of what Mr. Dewey has learned in this field in 20 years of study and work.

These lessons are the ones used in the correspondence course we gave in 1955 and 1956..(The correspondence course as such is no longer being given.)

The lessons start at the beginning and assume that you are a high school graduate with no knowledge of mathematics beyond arithmetic.

Four lessons are devoted to a study of the elementary statistics needed as a prerequisite for cycle study. These lessons are supplemented by parts of a college text book of statistics, also provided.

Nineteen lessons are devoted to the techniques of cycle analysis as such. Most of this material is unavailable from any other source.

The lessons are supplemented by additional comment and material which grew out of questions and mistakes of correspondence course students.

Problems are provided for the student to work, but *no papers will be corrected.* We are *not* offering a correspondence course.

The lessons are mimeographed on 8½ x 11 paper, punched for 3-hole binder. Printed charts are provided. Other printed material is included. There are over 600 pages in all, plus the text book on statistics referred to above.

The price for all the material and the text book is fifty dollars, cash with order.

Free examination for 10 days permitted. If not entirely satisfied you may return within that time for full refund.

Send in your check today and a set of the lessons will be prepared for you.

FOUNDATION FOR THE STUDY OF CYCLES

East Brady, Pennsylvania